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An evolutionary distributed computing approaches for large-scale and high performance technology

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Abstract

Growing popularity of communication, processing, storage technology and Internet software has led to the rise of virtual simulation. It allows for the secure sharing of resources around the world and collaboration in a distributed system. Distributed computing is a scientific approach to solving a larger problem by assigning a small part of a problem to multiple computers and then combining the solutions of the parts into a single solution.

Distributed computing is reaching new heights in today's world, performing complex tasks such as SETI@home and fold@home as part of a global workforce. Therefore, different approaches to architecture and IT implementation are considered. One way to distribute all the data and resources is called grid computing. And the other way is cloud computing, and that is the flavor of grid computing. Which together became six approaches to make up the distribution of the various programs.

In this research, we survey and analysis new finding for solving the problems of distributed applications such as grid computing and cloud computing, providing the new challenges needed to discuss the spread of tradition. And news traffic for forwarding, networking and cloud computing. Then compare the results of search analysis and modeling, good performance and scalability when searching for resources in a network environment. Network size it can solve computing problems in distributed systems and can adapt to various network resources and applications as well as a real basis for modeling and analysis.

Keywords: Distributed Computing, Grid Computing, Resource Sharing, Cloud Computing

Introduction

Distributed compute attempts to take advantage of the distributed resources in the network. Millions of computers connected to the Internet are often slow and can be part of a complex installation. In today's world distributed computing is scaling new heights and doing complex tasks like SETI@home and another folding@home project uses classification techniques related to distributed computation. To simulate the protein folding problem. It is a million times more challenging than before. However, there are many challenges in achieving the goal of global computing, and recent progress has been made in solving these problems through networking [1].

Grid computing should come from distributed computing, which makes it possible to use multiple computing resources at the same time. To solve a problem, grid computing is the use of hundreds, thousands or even millions of distributed cards and systems. Problem-solving requires more computing power with a wider range of resources than can be achieved with a single device or locally distributed system [Lewis, 2010]. Computers volunteer numbers and problems and are used in commercial enterprises for a variety of applications, such as chemical detection. Economic analysis Seismic analysis and database information to support business and services on your site.

Cloud computing is a relatively new distributed concept. It has recently gained popularity and is gaining ground like Amazon. Clusters take advantage of virtualization technology and isolate them from the network. With cloud computing, companies can achieve massive scale fast without much innovation. This is a great advantage for small and medium sized businesses. Cloud users can avoid the cost of tools, software and services if they pay businesses only for what they use.

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2. Materials and Methods
2.1 Distributed Computing
Computer distribution uses a network of multiple computers. By running a fraction of the total workload to arrive at a computing solution faster than a single computer. In addition to its high regulatory powers, distributed computing also enables multiple users to communicate and interact seamlessly. Distributed computers, such as computer programs, run on more than one computer at a time. Elements and object programs in particular are executed or controlled by various computer systems. Computer dissemination improves cultural integration by allowing computer components to distribute across networks and communicate with each other to perform tasks [4]. Increasing the number of computers may be an attempt to turn personal computers into excellent computer systems. Hundreds or thousands of machines.

Distribution software is a program that uses a specific set of rules to coordinate multiple tasks at a site so that all groups can work together to run one or more work networks. A distributed system can be a much larger and more integrated system where components can be distributed. This is a difficult goal to achieve due to the complexity of interactions between joint trust workgroups rather than a standalone system that once to be truly reliable, a distributed system must have the following characteristics [5].

- **Tolerance:** Defective parts can be returned and repaired without any defects.
- **High Availability:** The operation can be repaired. This allows service even if the parts are damaged.
- **Continuity:** The system can coordinate activities with multiple common components with consensus and failover. It defines the ability of a distributed system to function as an allocated system.
- **Control:** Can work directly even if several parts of the system are enlarged.
- **Doubtful action:** Ability to prepare must react quickly.
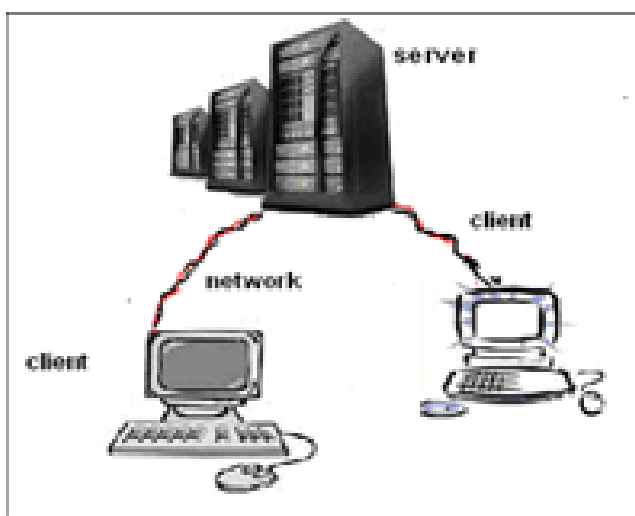- **Security:** A system for securing the use of information and services

Fig 1: Distributed Computing

3. Distributed Computing Projects
3.1 SETI@Home:
The project is a voluntary project for public computers on the Internet using standard BOINC software operated by the Space Science Laboratory at the University of California, Berkeley, United States. SETI stands for Alien Intelligence Search. Calculated on the web in Alien Intelligence Search (SETI) [Wikipedia [6]. Anyone in the world can participate by launching a free program to download and analyze data from the radio telescope at the SETI@ research center using data from a televised radio station at the Arecibo Observatory in Puerto Rico. Look for low-frequency radio signals that may be signs of foreign technology. Radio signal including sound is the challenge of finding the first radiation in the universe which can be called simple. This is because the direction, spectrum and mode of communication are not fully known in advance.

3.2 Folding@home
Fold@home is a distributed software project for the study of pathogens handling the folding of proteins. Structured molecular design and transformation of other types of molecules. The project has benefited from generating resources from thousands of personal computers. The volunteers installed the software in their system. The main goal is to determine the mechanism of protein folding. This is the process by which the protein reaches its final three-dimensional shape and investigates the causes of protein folding [7]. People all over the world download and use connected software to make it one of the largest computers in the world. Each computer brings the project closer to its goal. Figure 2 shows the increasing number of processors involved over the years.
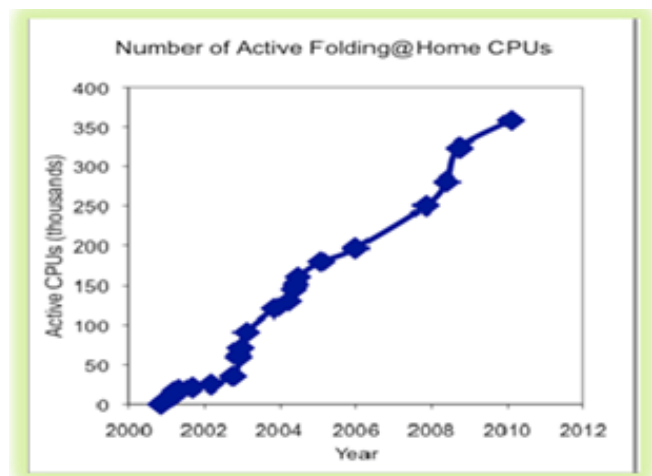

Fig 2: Active CPUs vs Time of Folding@home Project

3.3 Grid Computing
A grid is a distributed computer system that provides users with access to resources owned by organizations. Grid computing involves the flexibility and hassle-free distribution of various computer resources across multiple remote control and card systems. Lattice infrastructure is useful in many applications, including technical collaboration. Powerful analysis of data design and supercomputing [8].

The core idea of grid computing is to expand the traditional concept of the Internet by sharing decentralized computing. Grid middleware allows users to design computer systems and implement resource access in various network environments [10]. The layout of the network is shown in Figure 3.
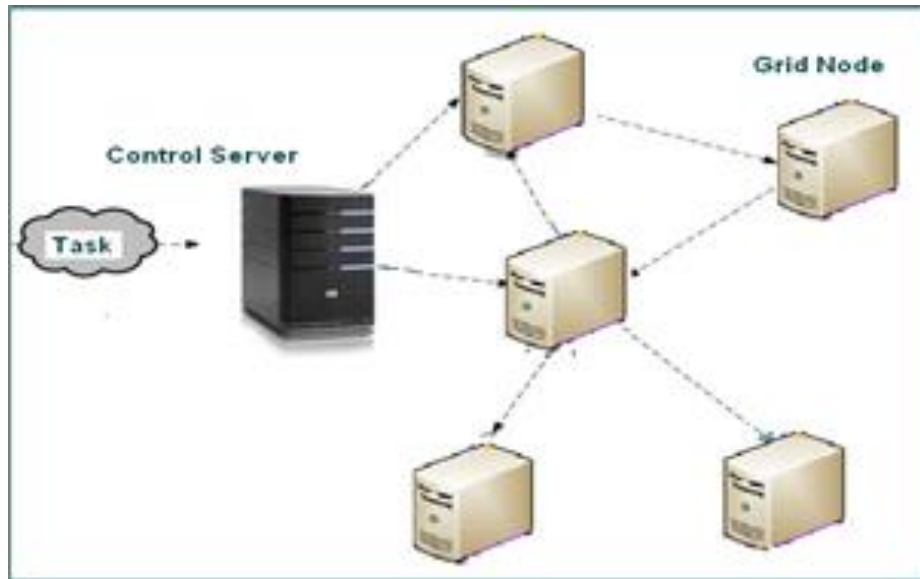
Fig. 3: Grid Computing

Grid technology looks like a bright future [11] for three reasons
• Ability to use all allocated computer resources.
• Solutions that cannot be realized without large quantities of planned power.
• It is recommended that multiple computing resources be interoperable and can be shared and collaborated in a single location.

3.4 Cloud Computing
Cloud computing has emerged from computer networks and has provided the most important content. Cloud computing has become a competitive way to build highly distributed systems. [12] Cloud computing is the optimization and promotion of ideas. From virtualization, applications led to distributed IT business management to more flexible implementation and scalability.
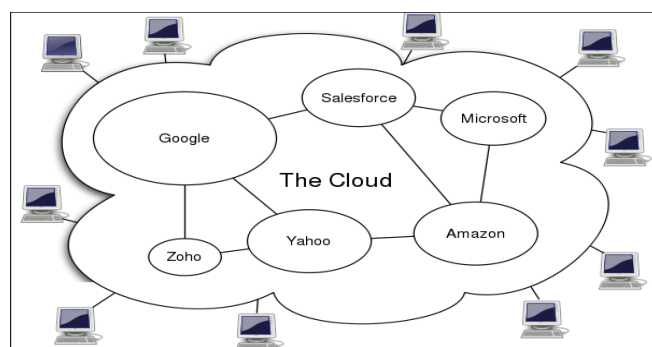

Fig 4: Cloud Computing

4. Grid Computing Vs Cloud Computing
Cloud computing and network computing can be integrated. This can be done by dividing the time for different applications running on different systems. And communication through web services CPU and network bandwidth is shared and not shared if needed. The level of network storage increases and decreases depending on the number of users, time and amount of data being logged at the same time. Cloud computing and grid computing have a lot in common. Everything can be rotated. All types of computations involve multitasking and multitasking, which means that multiple clients can perform different tasks. [12]

Cloud and network computing provides a standardized agreement (SLA) to deliver 99 percent uptime. Miscellaneous an important difference is that networks are often used to regulate performance. But the cloud is often used to make the service last longer. The network provides high-quality services that are not covered by the cloud – services that allow integrated dissemination research centers (such as virtual companies) to share data and eventually connect with researchers.

The network provides various niche services. Proceed to the use of virtual machine technology. But the usage will be the same. (Feature distribution pertains to a modeling environment, such as a VM image.) Users [13].

The comparison of the network (Easy Grid - Enabling the Grid for the EsciEnce Project) and the cloud (Amazon Cloud) is shown in Figure 5, which shows the power of cloud computing [14].

Cloud computing provides users with access to resources that are often rolled out as a service. By hiding the uniqueness of asset management [16], clusters and networks can therefore be part of the data center when developing a cloud design. This requires new objectives to optimize computational and general green transformations [17] and useful computations [18].
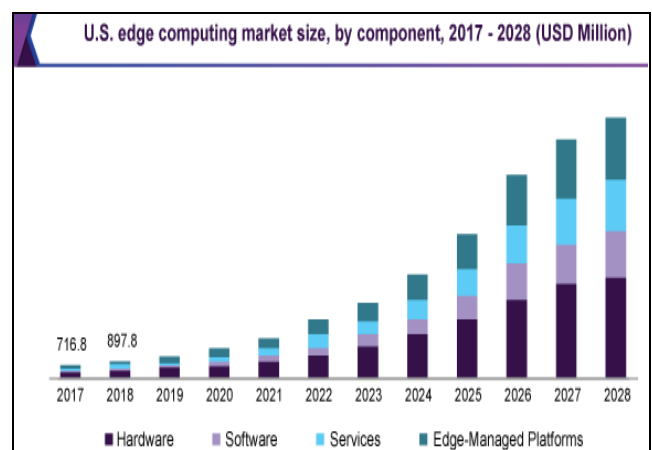
Source: www.grandviewresearch.com

Fig 7: Edge Computing Market Share & Trends report, 2021-2028 [15]

Table 1: Grid and Cloud Project

Features	EGEE Grid	Amazon Cloud
Target Group	The Grid of Scientific Community	big business
Service	Short-lived batch-style handing out (job execution)	Long-lived services based on hardware virtualization
SLA	Local (between EGEE Project and the resource provider)	Global (between amazon and users)
User Interface	High-level interfaces	HTTP(S), REST, SOAP, Java API Bit Torrent
Resource Side middleware	Open source (Apache)	Proprietary
Ease of use	Heavy	Light
Ease of Deployment	Heavy	Unknown
Resource Management	Probably similar	
Funding Model	Publicly funding	Commercial

5. Observation and Result
Figure 6 and 7 shows that after examining the questions and news about grid computing and cloud computing, the term grid computing has disappeared for some time. This analysis was thoroughly analyzed in 2007 and is rapidly gaining momentum.
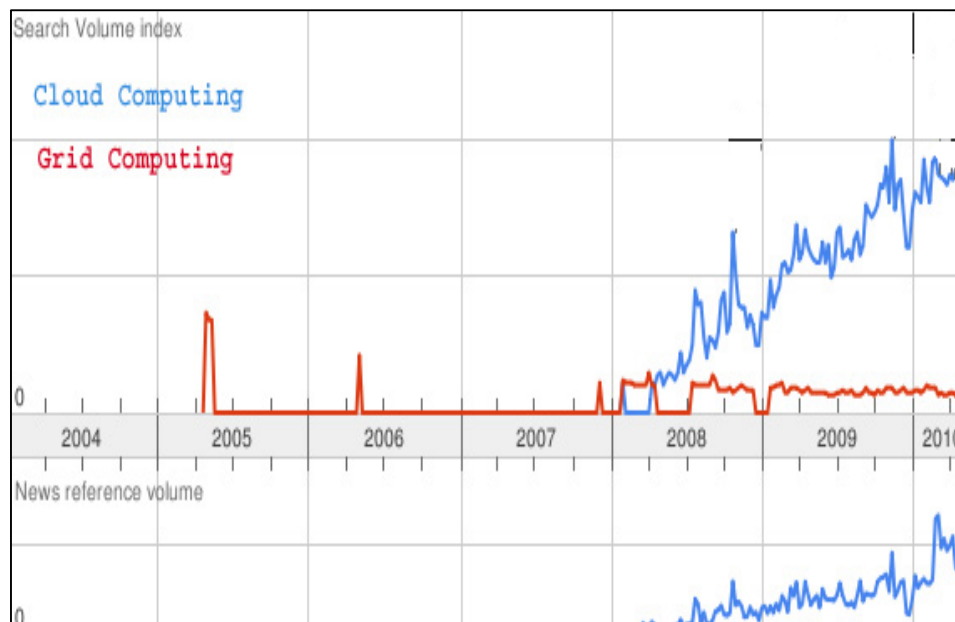
Fig 6: Analysis of Trends in Cloud Computing and Grid Computing

This Report describes different paradigms for distributed computing, namely grid, utility and cloud computing.

6. Discussion
Expanding wireless networks and, most importantly, increasing low-cost broadband access in developing countries. Enabling organizations to share their computing resources There are many exciting projects around the world that use network classification techniques with distributed computing to solve problems such as modeling protein synthesis or the search for life in the universe.

Modern computing deals with large amounts of data that use large amounts of computing power and high levels of storage. Grid Computing is designed to be an effective management tool in an organization. Because it involves the use of resources from different platforms with different owners and different functions [18].

Grid computing is a form of data distribution that is millions of times more challenging than ever before. Computer networks serve as a popular platform for large, energy-intensive applications. Another networking solution as a new approach to IT, cloud computing can significantly reduce IT cost and complexity. Ultimately, this research shows that networking and cloud computing technologies can take advantage of technologies in traditional distributed systems. And will present to researchers and formulate ideas for the current network. And while the system and challenges.

Authors Profile
Dr. Surendra Kumar Patel is currently working as Assistant Professor in the Department of Information Technology, Govt. N.P.G. College of Science, Raipur, India. He has published more than 25 research paper. His main research work focuses on Grid Computing and Cloud Computing and Internet of Things (IoT).He has more than 13 years of teaching experience and 10 years research experience.

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